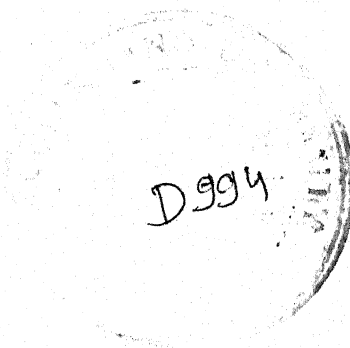
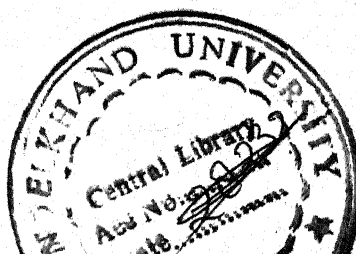


**LENS INDUCED GLAUCOMA : ITS TREATMENT
BY PLANNED EXTRACAPSULAR CATARACT
EXTRACTION AND POSTERIOR CHAMBER
INTRAOCULAR LENS IMPLANTATION**

Thesis for
MASTER OF SURGERY
(OPHTHALMOLOGY)



Bundelkhand University
Jhansi (U.P.)

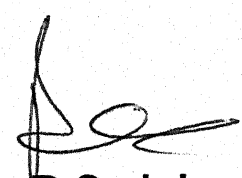


*Dedicated
to
my Parents*

CERTIFICATE

Certified that the research work entitled "Lens Induced Glaucoma : Its Treatment by Planned Extra-Capsular Cataract Extraction and Posterior Chamber Intraocular Lens Implantation" which is being submitted as thesis for M.S. (Ophthalmology) Examination of Bundelkhand University, 2001 by Dr. ABHISHEK VAJPEYI has been carried out in the department of Ophthalmology, M.L.B. Medical College, Jhansi.

He has put in the necessary stay in this department as per university regulations.

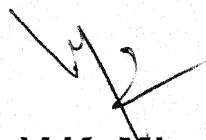


Dr.B.S. Jain
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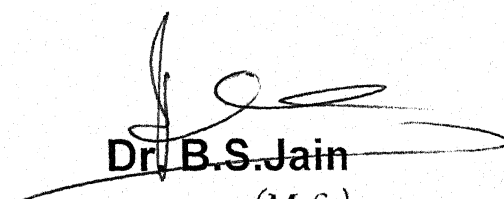
Certified that the research work entitled "Lens Induced Glaucoma : Its Treatment by Planned Extra-Capsular Cataract Extraction and Posterior Chamber Intraocular Lens Implantation" was conducted by Dr.ABHISHEK VAJPEYI under my guidance and Supervision. The investigations, techniques and statistics mentioned in the thesis were actually undertaken by candidate himself and the observations have been checked by me regularly.


Dr. V.K. Misuriya
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CERTIFICATE

Certified that the research work entitled "Lens Induced Glaucoma : Its Treatment by Planned Extra-Capsular Cataract Extraction and Posterior Chamber Intraocular Lens Implantation" was conducted by Dr.ABHISHEK VAJPEYI under my guidance and Supervision. The investigations, techniques and statistics mentioned in the thesis were actually undertaken by candidate himself and the observations have been checked by me regularly.



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It is a pleasure to avail this golden opportunity to express my sincere regards and thanks to my most esteemed guide and mentor Dr. V.K.Misuriya , M.S. Associate Professor , Department of Ophthalmology M.L.B. Medical College , Jhansi for his enlightened guidance which steered me towards the harbour of success. I am greatly thankful for the ceaseless attention, he has paid to my problems, always sparing a few moments for me even amidst the busiest of schedules without which this work would not have seen the light of day.

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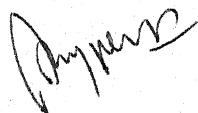
I would be failing in my duty, if I did not express my gratitude to my most revered and learned teacher Dr. V.K. Misuriya, M.S., Associate Professor, Department of Ophthalmology, M.L.B. Medical College, Jhansi for the

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Last but not the least , I am thankful to Mr. Rajendra Kumar Rai for the immense care and patience he has shown in typing out this manuscript.



Dated :

ABHISHEK VAJPEYI

CONTENTS

INTRODUCTION 01 - 04

REVIEW OF LITERATURE 05 - 22

AIMS AND STUDY 23

MATERIAL & METHOD 24 - 36

OBSERVATION 37 - 53

DISCUSSION 54 - 60

CONCLUSION 61 - 62

BIBLIOGRAPHY 63 - 69

Thirion Thomas
1880

Introduction

INTRODUCTION

Lens extraction is perhaps one of the commonest surgery being performed in the age group of fifty and above. This is largely due to the fact that of twelve million blind people in India, as high as 80.1% people fall under the category of "blindness due to cataract". What further grims the situation is another fact that the annual incidence of cataract is 3.8 million making a huge backlog of 22 million blind eyes. Keeping in mind the socio-political and economic scenario of the country it seems improbable if not impossible to treat so many eyes. As a natural consequence, the incidence of lens induced glaucoma is likely to increase. Moreover, the region of Bundelkhand, where this study was done is a backward area in terms of agriculture and industrilization. Thus a study on lens induced glaucoma was planned in the Department of Ophthalmology, M.L.B. Medical College, Jhansi.

An astronomically large proportion of Indian population lives in villages. Most of them are still below the poverty line, illiterate and do not understand the consequences of hypermaturation of cataract. The net result is lens-induced glaucoma and a very poor quality of life. This condition was present since time immemorial but remained

in the dark due to lack of literature and diagnostic tools. In the last two decades of the 19th century some scientist observed the frequent occurrence of iritis and rise in intraocular pressure during 'spontaneous cure of senile cataract'. This suggested some relationship between the spontaneous absorption of lens and lens induced glaucoma.

In European races, there is a gradual shrinkage of the lens with the development of cataract leading to a progressive deepening of anterior chamber, whereas in India intumescence is more common. This may largely explain the fact that phacomorphic glaucoma is unusual amongst them.

Heath (1941) described that intraocular pressure rises with rupture of the lens capsule and lens matter streaming into the anterior chamber with the capsule intact. Glaucoma of this type, which usually has a violent onset with characteristic pathological picture that is large histiocytes engulfing the liquefied lens material, is obstructing the trabecular meshwork. Zeeman who named the condition phacogenetic glaucoma also described these features. Subsequently various workers described such type of cases under different names like lens induced veitis and glaucoma, phacotoxic, phacogenic and finally phacolytic glaucoma.

Lens induced glaucoma may be classified as :

1. Phacolytic glaucoma.
2. Phacomorphic glaucoma.
3. Phacoanaphylactic glaucoma.
4. Glaucoma due to dislocated lens.
5. Lens particle glaucoma .

It may be classified in another manner:

- (A). Lens induced secondary open angle glaucoma (phacogenic).
 - (a) Phacolytic glaucoma.
 - (b) Phacoanaphylactic glaucoma and uveitis.
- (B). Lens induced secondary angle closure glaucoma.
 - (a) Due to intumescent stage.
 - (b). Due to subluxation or dislocation of lens.
 - (c). Due to microspherophakia.

Many controversies still exist regarding the management of lens induced glaucoma. This clinical entity has traditionally been associated with poor visual outcome. Historically, intracapsular cataract extraction has been the

treatment of choice for these conditions. Now there has been a distinct shift towards extracapsular cataract extraction with in the bag lens implantation. Some scholars still reserve their opinion regarding the usefulness of anti-glaucoma procedures along with cataract extraction. This preventable and curable condition though rare in developed countries is unfortunately still prevalent in India. The main aim of this study is to evaluate the incidence, risk factors in final visual acuity and visual result following extracapsular cataract extraction with in the bag lens implantation.



Review
of
Literature

REVIEW OF LITERATURE

Glaucoma is one of the leading causes of blindness and is responsible for 3-5% of all blindness in India. Glaucoma may be primary or secondary to some ocular or non-ocular disorder which alter the aqueous dynamics resulting in elevation of intra-ocular pressure. Thus glaucoma refers to a variety of disorders which differs in their clinical presentation, pathophysiology and modes of treatment.

The word glaucoma first appears in the works of Hippocrates (420B.C.) together with amblyopia in the list of eye diseases affecting the elderly. It is an ancient Greek word as glare such as silvers of the sky as dull sheen of an eye, which has lost its brightness. Sams ad din (1806) described glaucoma as migraine of the eye, an illness associated with pain dullness of humour followed by dilation of pupil.

Szily (1884) first time observed the occurrence of glaucoma in case of long-standing mature cataract. Reuss also noticed the occurrence of iridocyclitis and glaucoma in cases of spontaneous cure of senile cataract. Gifford (1900) described the lens-induced glaucoma as the one associated with hypermature cataract and urged its prevention by lens extraction. Instances of this condition are also sighted by Rollet and Genet (1913) Gonzaliz (1919), Daily (1933), Knapp

(1937), Sugar (1949) and Scott (1953). Kaufan(1933) mentioned that in such cases cholesterol crystals were seen in anterior chamber.

Though lens induced glaucoma can be classified in variety of ways we shall be following a working classification. This classification is based on Epstein D.L.; Diagnosis and management of lens induced glaucoma, (1982).

1. Phacolytic glaucoma.
2. Phacomorphic glaucoma.
3. Phacoanaphylactic glaucoma.
4. Glaucoma due to dislocated lens.
5. Lens particle glaucoma .

The diagnostic criteria were as follows:

1. *Phacolytic glaucoma*

IOP of more than 21 mm of Hg.

Pain.

Hypermaturation cataract.

Corneal oedema +/-

Floating lens particle or pseudohypopyon. +/-

Anterior chamber depth normal/deep.

2. Phacomorphic glaucoma.

IOP of more than 21 mm of Hg.

Pain.

Intrumescent cataract

3. Phacoanaphylactic glaucoma.

IOP of more than 21 mm of Hg.

Pain.

Corneal oedema

History of E.C.C.E. or penetrating injury.

4. Lens particle glaucoma.

IOP of more than 21 mm of Hg

Pain.

Corneal oedema

Chunky Corneal oedema +/-

Anterior chamber depth $< 1/4$ of the peripheral corneal thickness.

White particles in aqueous with heavy cell flare.

5. *Dislocated lens*

IOP of more than 21 mm of Hg

Pain.

Corneal oedema

Dislocated or subluxated lens.

Parker Heath (1940) classified secondary lenticular glaucoma lens to be due to:

1. Lens in position.
2. Lens out of position.

Glaucoma with the lens in position can be due to-

- Imperfect differentiation of angle
- Intumescent lens associated with irritative contact with the ciliary processes
- Toxic substances escaping through the permeable capsule of a hypermature cataract
- Desquamation of capsule
- Following uveitis which causes posterior synechiae and iris bombe formation.

- Perforating wounds to the lens.
- endophthalmitis phacoanaphylactica.

Glaucoma with the lens out of position can be due to:

- Congenital lental ectopia.
- Subluxation of lens making it come into contact with ciliary processes
- Subluxation into anterior chamber causing pupillary block.
- Subluxation into cornea –phacocoele due to corneal perforation.
- Subluxation into anterior, posterior or central vitreous.
- Subluxation into retina or optic nerve head.

Fiocks Milton et al conducted a clinical study in 1955 where they observed the clinico-pathological picture of 138 cases. They observed that liquefaction of lens cortex and degeneration of its capsule permitted the escape of lens liquid into the anterior chamber. Capsule rupture was not an essential factor behind it. The lysed cortical material evoked a histiocytic response and consequent plugging of trabecular

spaces by macrophages. It follows that after delivery of the lens, anterior chamber should be irrigated to remove the macrophage laden fluid as far as possible. On biopsy the optic disc nerve and the retina were well preserved. A natural conclusion was made that removal of hypermature lens and irrigation of anterior chamber obtained good visual results.

Smith and Zimmermann (1965) conducted another study where 125 cases of phacolytic glaucoma were reviewed from old files. The cross section from all the eyes was examined noting the configuration of angle of anterior chamber. The object was to determine the frequency of angle recession occurring as a result of trauma. In 25% of cases there was unequivocal evidence of trauma while another 18% had equivocal evidence of contussive damage. A definite history of trauma was found in 50% of cases showing unequivocal changes of trauma, 44% of cases with equivocal changes had a history of trauma. Therefore, phacolytic glaucoma has been thought to occur almost exclusively as a complication of senile hypermature cataract unassociated with other intraocular disease. The present study shows that in early 20% of cases, there is a definite evidence of angle recession. Thus trauma could be implicated in pathogenesis of phacolytic glaucoma. In most cases prompt cataract extraction is curative, unsatisfactory results may be obtained

if there has been considerable subclinical damage to retina and optic nerve prior to the onset of phacolytic glaucoma.

Epstein D.L. et al from patients of phacolytic glaucoma identified high molecular weight soluble proteins later on in 1977. Aqueous humor was obtained at the time of cataract operation from six patients of phacolytic glaucoma daignosed on basis of acute open angle associated with an apparently leaking hypermature or mature cataract and from six control patients with immature cataract. Three of the latter had primary open angle glaucoma. Quantities of high molecular weight protein ($>150 \times 10^6$), sufficient to obstruct aqueous outflow were identified in all six cases of phacolytic glaucoma. In none of the controls protein levels were as high. Three of the hypermature cataractous lenses from the cases of phacolytic glaucoma were also examined and were found to have 14 fold greater quantities of high molecular weight proteins in their liquefying cortex than were present in the cortex of immature cataractous lenses. These findings correlated with high molecular weight protein perfusion studies suggested direct obstruction of aqueous outflow channels by liberated high molecular weight soluble lens protein and thus causing phacolytic glaucoma.

Epstein D L (1982) in a review titled 'Diagnosis and management of lens induced glaucoma' said that lens

induced glaucoma may occur either as secondary angle closure or open angle glaucoma. Dislocation or swelling of lens can cause pupillary block and subsequent angle closure glaucoma. Leakage of soluble lens particle from a relatively intact cataractous lens can result in a severe secondary open angle glaucoma (phacolytic glaucoma). Heavy molecular weight protein believed to be of lens origin was identified in twelve out of twelve anterior chamber specimens from such patients. This liberated lens protein can directly obstruct the trabecular outflow pathways. After extracapsular cataract extraction or lens trauma, liberated fragments of lens material may mechanically impair the drainage of aqueous humor thorough the outflow channels (lens particle glaucoma). The diagnosis and management of these different lens induced glaucoma were reviewed and surgical removal of the lens and lens material suggested as treatment for good visual rehabilitation. Lens dislocation causing angle closure glaucoma should be treated by peripheral iridotomy especially laser iridotomy or by iridectomy.

Jain IS et al (1983) studied eighty-six cases of phacomorphic glaucoma - its management and visual outcome. They recorded incidence of phacomorphic glaucoma to be 3.91%. In all 86 cases intraocular pressure could be controlled preoperatively with or without mannitol.

Intracapsular cataract extraction was done in 49 eyes, planned extracapsular extraction in nine eyes and combined extractions in nine eyes. 19 eyes had accidental rupture of lens capsule.

93% of cases had normal intraocular pressure at the end of the follow up period without any medication and irrespective of the duration of attack and the type of surgery. Final visual outcome was directly related to the duration of attack. 54.5% of the eyes with less than 2 days of attack regained 6/12 or better visual acuity, whereas if the attack lasted 3 weeks or more visual acuity was no better than hand movements or perception of light.

Optic disc changes in the form of pallor, glaucomatous cupping and atrophic cupping were directly related to the duration of attack of the 59 eyes in which duration of glaucoma was less than 10 days, 45 eyes (76.2%) had clinically normal optic disc. Though bilateral phacomorphic glaucoma was encountered in nearly 14% of the eye cases, they do not recommend prophylactic iridectomy on the fellow eyes as –

- a) The occurrence of phacomorphic attack seemed to occur almost 10 years later.

- b) The surgical procedure itself may accelerate the formation of a hydrated cataract
- c) Observation of acute phacomorphic glaucoma in 3 eyes where an iris inclusion had already been done.

Lane Stephen S et al (1988) studied the efficacy of extracapsular cataract extraction as a definitive treatment for phacolytic glaucoma. 5 cases of phacolytic glaucoma that occurred between 1984 & 1986 were studied from retrospective chart review. Extracapsular cataract extraction with placement of a posterior chamber intraocular lens was performed and was curative in all 5 eyes. All patients (100%) maintained intraocular pressures of less than 20 mm of mercury without medical therapy. The best corrected visual acuity for all cases was 20/50 or better (80% had more than 6/12) with 5 months to 5 years follow up. They concluded that extracapsular cataract extraction with posterior chamber intraocular lens placement is a safe and efficacious treatment for phacolytic glaucoma. According to them the phacolytic lens capsule was not more fragile. Although they preferred extracapsular cataract extraction with posterior chamber intraocular lens as treatment of choice for phacolytic glaucoma, they also said that the surgeon should employ the technique with which he was more familiar that is

intracapsular cataract extraction or extracapsular cataract extraction.

Angra SK et al (1991) described an insight into management of cataract induced glaucoma. They studied 40 cases of phacomorphic glaucoma and evaluated the efficacy of medical therapy, intraoperative and postoperative complications, and the effect of high intraocular pressure and surgical trauma on the corneal endothelium.

They found that 55% of the patients were in the group of 50 to 60 years. The incidence of phacomorphic glaucoma was 3.91%. 23 of the patients had immature intumescent cataracts, while 17 had hypermature swollen cataracts. Pre-operative intraocular pressure ranged between 34 to 83 mm Hg. Medical therapy given was with topical pilocarpine, oral glycerol, acetazolamide and intravenous mannitol. They found no relationship with duration of attack and height of intraocular pressure. In 37.5% of eyes intraocular pressure could not be controlled with medical therapy. These eyes were found to have extensive peripheral anterior synechiae and longer duration of attack. Inaccurate light projection could be corrected in 9 out of 16 patients with medical treatment alone. Endothelial cell loss was found to be 14.8% after the attack.

Cases were randomly subjected to intracapsular cataract extraction alone or ICCE with trabeculectomy. Striate keratopathy and shallow anterior chamber was more post-operatively in the ICCE group. Control of intraocular pressure post-operatively was better in the combined extraction group. Only in 75% of patients intraocular tension could be normalized post-operatively. In those with longer duration of attack, cataract extraction alone does not seem to control tension. Better overall visual recovery was achieved in the combined extraction group. Initial faulty light projection does not necessarily mean a poor visual outcome. Final visual acuity was related more to duration of attack than to type of cataract or modality of surgery.

Tomey KF and Rajhi AA (1992) reviewed 10 patients of phacomorphic glaucoma who underwent Nd: YAG laser iridotomy for the initial management of acute angle closure glaucoma. In all the cases the acute angle closure glaucoma could be reversed by iridectomy before cataract extraction. They felt that pupillary block and responds caused the initial angle closure well to the same type of treatment as primary angle closure glaucoma, namely iridotomy. According to them laser iridotomy benefits phacomorphic glaucoma cases in 3 ways:-

1. After iridotomy, the eye is allowed to quiet down from an acute attack and thus be in a better condition for cataract surgery.
2. Pre-operative mydriasis becomes safer.
3. It becomes possible for the surgeon to decide whether glaucoma surgery should be performed simultaneously with cataract extraction.

Lin TH et al (1993) carried out a retrospective study of 995 eyes that underwent cataract surgery between January and March 1990. The study revealed that one in 20 (50 eyes) were of advanced cataracts (hypermature, morgagnian and intumescent). 30% of these cases suffered from cataract related complications pre-operatively: phacomorphic glaucoma (12/50 eyes) phacolytic glaucoma (1/50 eyes) and subluxated cataract without trauma (2/50 eyes). Cataract surgery in these advanced cataracts produced significantly poorer results than the rest. 1 in 4 eyes failed to achieve a visual acuity of 6/12 or better post-operatively, while 1 in 8 eyes did not improve beyond hand movement vision. They concluded that the main reason for poor visual results was lens-induced glaucoma 80%.

Singh G et al (1994) evaluated the results of conventional extracapsular cataract extraction with posterior

chamber intraocular lens in a series of 5 cases of phacolytic glaucoma. 5 cases between the age of 64 and 70 years were taken. Only those cases with minimal lenticular changes and good visual status in the fellow eyes were included in the study to avoid problems of unilateral aphakia. The period between diagnosis and surgery varied between 3-6 days depending on the control of uveitis and glaucoma. The same surgeon operated all the cases, after control of uveal inflammation and intraocular pressure by appropriate medical therapy. In this study, with a mean follow up period of 2 years all patients maintained a normal post-operative intraocular tension of less than 20 mm Hg without any additional medical therapy. The best corrected visual acuity in 80% of cases (4 out of 5) was 6/12 or better. Vision was 6/24 in one case due to senile maculopathy. Hence they concluded that planned extracapsular cataract extraction with posterior chamber intraocular lens implantation is a safe and effective method of visual rehabilitation in cases of phacolytic glaucoma.

Mandal AK (1994) described endocapsular surgery and capsular bag fixation of intraocular lens in 19 cases of phacolytic glaucoma. Anterior capsulotomy is the key step in endocapsular cataract surgery. This is easier in immature cataracts but requires great care in eyes with phacolytic

glaucoma with hypermature morgagrian cataracts, where the capsule is fragile, zonules are weak and view obscured by milky white fluid cortex leaking from the taut capsular bag into anterior chamber. To overcome these difficulties, he recommended aspiration of milky fluid cortex from the capsular bag before capsulotomy so that a minimal amount of irrigating solution is required for cortical clean up. This he called the "dry technique" of extracapsular cataract extraction in morgagrian cataract. He also recommended a V-shaped anterior capsulectomy with angled vannas scissors to avoid zonular dialysis. Before the nucleus is delivered, methylcellulose is injected between the nucleus and posterior capsule to severe adhesions that are sometimes present between the nucleus and the posterior capsule. Posterior chamber intraocular lens was implanted in 8 out of 19 eyes. Extracapsular cataract extraction was done in 11 eyes. 16 eyes (84.2%) achieved visual acuity 6/12 of which 8 were those with intraocular lens and 8 with extracapsular extraction alone. Relatively poor visual acuity in remaining 3 eyes was due to delayed presentation causing glaucomatous damage to the optic nerve. Post operative I.O.P. of <20mmof Hg was achieved in all eyes without anti-glaucoma medication.

Barnhorst D et al (1996) reported an unusual case of lens induced glaucoma that occurred 65 years after congenital cataract extraction. It was a case of lens particle glaucoma caused by pieces of lens material, which are loosened when the lens capsule is disrupted by trauma or during an operation. However, increased I.O.P. in these cases usually occurs a few days after trauma or operation and rarely years later. The patient underwent a pars plana vitrectomy to remove the yellow cortical lens matter. Six months later best-corrected visual acuity was 6/12 tension by applanation tonometry was 21 mm of Hg and ant chamber and vitreous cavity had no cells or flare. In this patient the moderately large amount of residual lens material probably increased the risk of lens induced glaucoma. Perhaps it took many years for the lens matter to denature into high molecular weight protein and subsequently break into small pieces and release soluble lens protein resulting in lens particle and phacolytic glaucoma.

Pranja N V et al (1996) studied the clinical models of presentation and post operative usual results in 93 patients with lens induced glaucoma of which 59 were of phacomorphic glaucoma and 44 were of phacolytic glaucoma. All the patients were subjected to planned extracapsular cataract extraction. 44% had a posterior chamber intraocular

lens implantation following surgery. 57% eyes with phacomorphic glaucoma and 61% with phacolytic glaucoma recovered visual acuity of 6/12 or better. They found that there was no significant difference in the visual acuity between those patients who had an intraocular lens implantation and those who did not ($p=0.18$). They found a slight female preponderance (54%) of lens induced glaucoma. The fellow eye in the case of patients with phacomorphic glaucomas had immature cataract in 80% patients, while in the case of phacolytic glaucoma, they were predominantly aphakic (72%). The mean I.O.P. in the case of phacomorphic glaucoma was marginally higher (45 ± 12 mm of Hg) than in phacolytic, in whom it was 40 ± 11 mm of Hg. They also studied the risk factors determining the final visual acuity. They concluded that age more than 60 years and patients in whom the glaucoma was present for more than 5 days had a significantly higher risk of poor visual outcome post-operatively.

Mandal A K in 1997 in a review titled "An alternative way to manage patients with Morgagnian cataracts and Phacolytic glaucoma" claimed that a simple technique of endocapsular surgery and capsular bag fixation of intraocular lens was safe and effective way of treating patients of phacolytic glaucoma. He studied 37 cases of phacolytic

glaucoma over a period of five years. A visual acuity of 6/12 or more was achieved in 66.7% of those who underwent extracapsular cataract extraction and 84.6% in those with extracapsular cataract extraction with posterior chamber intraocular lens implantation. I.O.P. was well controlled in all patients without anti-glaucoma medication. Poor visual recovery was attributable to glaucomatous disc damage. The duration and elevation of I.O.P. did not cause any clinically detectable damage in the outflow pathway even when associated with significant glaucomatous disc damage. Hence he concluded that addition of trabeculectomy to cataract extraction is superfluous in control of intra-ocular pressure in patients with phacolytic glaucoma operated within 2 to 3 weeks of onset of symptoms.



Aims Of Study

AIMS OF STUDY

The aims and objective of this study are threefold. In this study an attempt has been made to calculate the incidence of lens induced glaucoma, specific factors if any in determining the final visual acuity in these patients and most importantly, how many patients achieve the final visual acuity of 6/12 or better.



Material
And
Methods

MATERIAL AND METHODS

The present study was carried out in the department of Ophthalmology, M.L.B. Medical College and Hospital, Jhansi. The patients had marked visual defect because of advanced lenticular opacity and raised intraocular pressure. The patients suffering from lens induced glaucoma were taken up for the study.

The patients were of both sex and age and ranged from 20 to 80 years. The numbers of eyes undergoing surgery were 36. The minimum follow up period was six weeks to a maximum of 6 months. The consultant surgeons of the department did the surgeries.

The following pattern was adopted for almost all the patients.

History:

A meticulous recording of history was done in each case. History of headache and eye ache, its severity, duration and association with vomiting, diminution of vision, redness and watering of eye. History of antiglaucoma therapy was taken and noted if any. Past history regarding previous attack of visual disturbance, vomiting diabetes and trauma was

recorded. Symptoms relating to diabetes and hypertension were asked and addiction to any drug especially marijuana (ganja) was noted.

Examination:

Complete systemic examination was done in all the cases and expert opinion was sought for as and when needed. A record of pulse rate, blood pressure, temperature and examination of cardio-vascular system, respiratory system and central nervous system was done.

The local examination was done under bright illumination and a general opinion was drawn regarding the condition of conjunctiva, cornea, anterior chamber, iris pupil and lens. The slit lamp examination was done routinely particularly to examine transparency of cornea, depth of anterior chamber ($>1/4$ of the peripheral corneal thickness at the periphery of the anterior chamber was taken to be deep) aqueous flare, keratic precipitates, extent of lenticular opacity and pigmentary dispersion over the lens and to elicit pupillary reaction in doubtful cases.

Investigation:

Routine:

It included urine examination particularly for albumin and sugar in all cases and when indicated, total leucocyte

count, differential leucocyte count, haemoglobin in gram% and erythrocytic sedimentation rate were done.

Special:

1) *Visual acuity-*

This was recorded in terms of Snellen's test type, finger counting, hand movement, perception of light and projection of rays depending upon the visual status of the patient. The best-corrected visual acuity was recorded in the post operative and follow up period. In a few cases Nd: YAG laser capsulotomy was done to improve the vision.

2) Pupillary examination-

Pupils of both eyes were seen for: -

- Pupillary reaction
- Size of the pupil
- Shape of the pupil.

Pupillary reactions, both direct and consensual were seen with the help of a spotlight. Size and shape were assessed by the help of the same.

Tonometry-

It was performed by the help of the Schiotz tonometer with standard technique. Almost in all cases one particular

tonometer was used preoperatively, postoperatively and in follow-up period. The technique by which intraocular pressure was recorded is as follows: -

- Patient was asked to lie down in supine position looking straight at the ceiling of the examination room.
- Xylocaine 4% was instilled in both the eyes until local anesthesia was complete.
- Both eyelids were separated with the finger without pressing on the eyeball and then the tonometer was placed vertically on the cornea so that it rests by its own weight.
- Depending on the tension of the eye there was a deflection of the recording needle on the scale.
- The reading on the scale was then translated from the conversion chart into mm of Hg.

3) **Funduscopy-**

Both distant direct and direct ophthalmoscopies were done pre and post operatively by Hiene beta 200 ophthalmoscope. Indirect ophthalmoscopy was also done in cases where media was very hazy. The condition of the optic

disc such as size, shape, colour, cupping, nasal shifting of vessels and cup disc ratio were noted. Besides this, any other abnormality of the fundus was also recorded.

4) Gonioscopy-

It was done in co-operative patients by Goldman's three-mirror gonioscope to assess mainly the angle status (open or closed). Besides these the peripheral anterior synechiae and neo-vascularization if any were noted.

The angle was graded as:

Angle	Degree	Grade	Clinical interpretation
Wide angle	30 - 40	3-4	Closure impossible
Moderately narrow	20degree	2	Closure possible
Extremely narrow	10 degree	1	Eventual closure
Slit angle	<10degree	S	Partially closed
Closed angle	-		Closed angle

Shaffer's system:

- a) Grade 4 –ciliary body seen (angle 35-45 degree)
- b) Grade 3 –scleral spur seen (angle 25-35 degree)
- c) Grade 2 – trabeculum seen (angle 20 degree)
- d) Grade 1- schwalbe's line seen (angle 10 degree)
- e) Grade 0- no structure seen (angle 0 degree)

However there were some difficulties experienced during gonioscopy. They are as follows:

- a) Scleral lip of Goldmann lens may indent to produce a narrow angle.
- b) Pressure of the lens should not induce folds upon Descemet's membrane.

5) **Field charting** -

It was done in co-operative patients (where the visual acuity permitted) to assess the extent of glaucomatous field changes. It was done by Goldmann perimeter. It is the first of its kind, which provides standardized background and stimulus intensity. It has a facility for telescopic fixation monitoring. It was calibrated daily by the help of a light meter provided in such a way that the maximum stimulus V4e was equal to 1000 apostilbs. The background stimulus should be

31.5 apostilbs. The object size is designated by Roman I-V whereas the luminescence is designated by Arabic 1-4 followed by a-e. I2e is the established standard test stimulus for central visual field and provides a comparison for other patients and eyes. I4e is the test object for far periphery.

Diagnostic criteria

Lens induced glaucoma may be classified as:

1. Phacolytic glaucoma.
2. Phacomorphic glaucoma.
3. Phacoanaphylactic glaucoma.
4. Glaucoma due to dislocated lens.
5. Lens particle glaucoma .

The diagnostic criteria were as follows:

1. Phacolytic glaucoma

IOP of more than 21 mm of Hg.

Pain.

Hypermaturation cataract.

Corneal oedema +/-

Floating lens particle or pseudohypopyon. +/-

Anterior chamber depth normal/deep.

2. Phacomorphic glaucoma.

IOP of more than 21 mm of Hg.

Pain.

Intumescent cataract

3. Phacoanaphylactic glaucoma.

IOP of more than 21 mm of Hg.

Pain.

Corneal oedema

History of E.C.C.E. or penetrating injury.

4. Lens particle glaucoma.

IOP of more than 21 mm of Hg

Pain.

Corneal oedema

Chunky Corneal oedema +/-

Anterior chamber depth <1/4 of the peripheral corneal thickness.

White particles in aqueous with heavy cell flare.

5. **Dislocated lens**

IOP of more than 21 mm of Hg

Pain.

Corneal oedema

Dislocated or subluxated lens.

Once the condition was diagnosed horizontal and vertical meridians of the cornea were measured in terms of their diopter strength. They were designated as K1 and K2. This was done by using a Bosch and Lomb optical keratometer. The axial length of the eyeball was measured by A-scan ultrasonography in mm. The two values were put in S R K II formula and exact power of the posterior chamber intraocular lens was calculated.

After obtaining informed consent and explanation of a relatively guarded prognosis, the patients irrespective of diagnosis were subjected to planned extracapsular cataract extraction and posterior chamber intraocular lens implantation.

Pre-operative preparation.

The patients were mentally prepared to undergo cataract extraction and were advised to instill ciprofloxacin 0.3% eye

drops in order to make the sac sterile. The eyelashes were cut a day before and lignocaine sensitivity was done. To relieve the apprehension, anxiety and to have a good sleep night before the operation, alprazolam .25 mg tablet H.S. and another in the morning were given. The intraocular pressure was controlled by acetazolamide 250 mg two tablets H.S. and another two tablets C.M. Proper dilatation of pupil was ensured by instilling phenylephrine + tropicamide ophthalmic solution along with flurbiprofen eye drops.

Anaesthesia.

Topical – by instillation of 4% lignocaine eye drops 2-3 times at an interval of 2 minutes.

Regional- by parabolbar injection of 2% lignocaine along with adrenaline after mixing sodium hyaluronidase. Intraocular pressure was lowered further by digital massage or by putting a weight as and when needed.

Steps of operation

The operation was done under 7x magnification obtained by a co-axial Lieca microscope. After superior rectus suturing, lids were retracted by putting a wire speculum. A fornix-based flap was formed and the superficial vessels cauterized by a bipolar electrical cautery or by a thermal cautery. Then with a help of a blade incision was marked on

the limbus and anterior chamber was perforated at 12 o' clock. Methylcellulose was now injected in the anterior chamber mainly to prevent the corneal endothelium from being damaged. Anterior capsulotomy was now done by can opener method using a cystitome made out of a 26-gauge needle. Proper hydrodesection and hydrodelenation was done and nucleus was delivered by pressure and counter pressure technique. Anterior chamber was now washed by Ringer lactate irrigating solution and all the excess lenticular matter and capsule tags were now removed till the proper fundus glow was visualized. It was now doubly assured that the posterior capsule is intact. Anterior chamber was now reformed by using methylcellulose intracameral injection. Posterior chamber intraocular lens was implanted 'in the bag' by either flexion or dialing method. Small peripheral iredeotomy was done in selected cases. Anterior chamber was again washed by ringer lactate solution to remove the excess methylcellulose and sterilized air was injected to reform the collapsed chamber. Proper corneo-scleral stitches were applied by using 10-0 monofilament and the knots were buried under the conjunctival flap. Sub-conjunctival injection of dexamethasone and gentamycin was given and the eye was bandaged after putting combined eye ointment.

Post-operative management:

The patients were kept 'nil orally' for at least two hours post-operatively. 80 mg of gentamycin was given intramuscularly to each patient twice daily for three days along with a single stat dose of 3 ml of diclofinac sodium. A suitable systemic antibiotic usually ciprofloxacin 500 mg twice a day for five days was administered to each case. Furthermore to alleviate the rise in intraocular pressure timilol 0.5% was administered twice a day for fifteen days along with combined eye drops which was given six times a day to nullify the damage caused to iris if any. On the first post-operative day the operated eye was examined thoroughly and green eye shield or dark glasses were provided. Particular attention was paid to the condition of section wound, striate keratopathy, depth of anterior chamber, hyphema and any sign of iritis were managed accordingly. In uncomplicated cases the patient was discharged with the follow up treatment and advice on the second post-operative day.

Follow-up:

The patients were advised follow-up examination at the seventh day after discharge. They were examined meticulously for any infection, haziness of cornea, depth of

anterior chamber and condition of the iris. Funduscopy was done to evaluate the condition of the disc. Special attention was paid to the vision and intraocular pressure. The second follow-up examination was done after an interval of one month. This was the time when stitches, if needed, were removed. Pseudophakic correction was done after a week and final examination was done after another one month. All significant findings were recorded for the final assessment.



Observation

OBSERVATION

The present study, 'Lens induced glaucoma: Its treatment by planned Extracapsular cataract extraction and posterior chamber intraocular lens implantation' was carried out in the Department of Ophthalmology M.L.B. Medical College and Hospital, Jhansi. During this period 41 patients of lens induced glaucoma were studied of which 36 patients were operated by the aforesaid procedure. The follow-up period of the patients was 3 months.

In this study of 619 cataract patients operated by various units of our department, 36 patients were treated for lens induced glaucoma. Five patients were treated on out patient's department ticket, as they did not turn up for surgery. Such patients have been included in the study only for clinical and academic interest. So in a group of 41 patients the results were as follows.

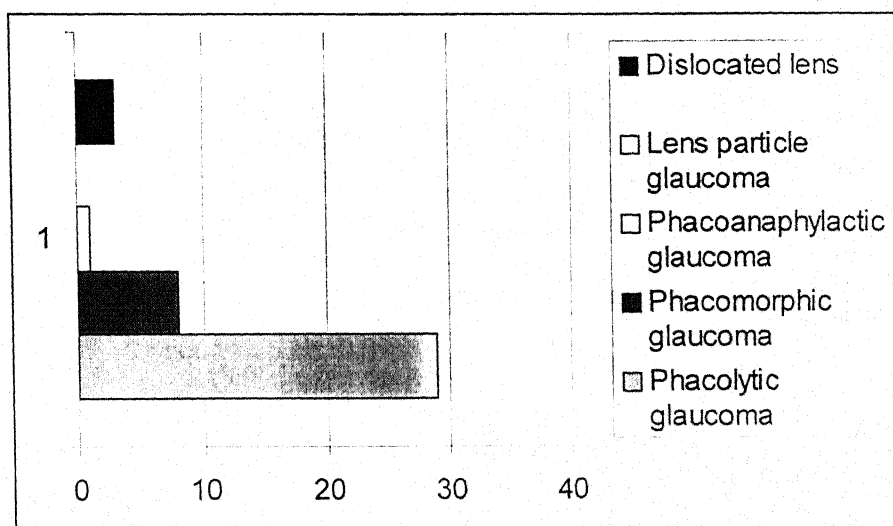
Total number of cataract surgeries: 619

Total number of lens induced glaucoma: 41

Percentage: 6.62%

Incidence of various sub types:

SUB-TYPE	NUMBER	PERCENTAGE
Phacolytic glaucoma	29	70.07%
Phacomorphic glaucoma	08	19.51%
Phacoanaphylaxis	01	02.05%
Lensparticle glaucoma	00	00.00%
Dislocated lens	03	07.31%
Total	41	



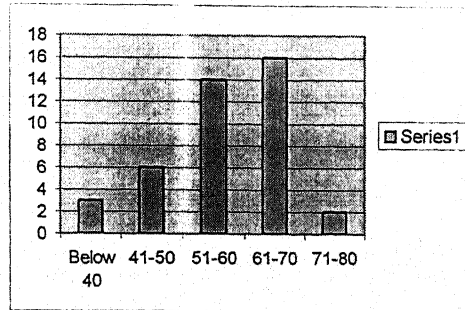
Sex distribution

Male	18	43.91%
Female	23	56.09%
Total	41	

Age:

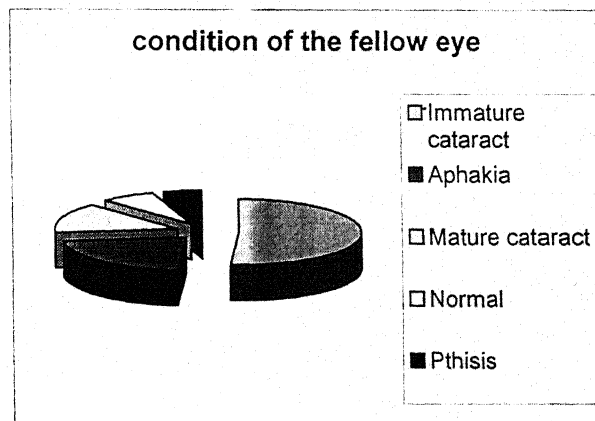
The youngest patient in the study group was a 20-year male where the lens had subluxated leading to increase intra-ocular pressure following blunt trauma. On the other hand the eldest patient was an 80 year old male having phacolytic glaucoma. The age wise analysis is as follows:

Age (years)	Number	Percentage
Below 40	03	07.31%
41 - 50	06	14.62%
51 - 60	14	34.14%
61 - 70	16	39.02%
71 - 80	02	04.90%



Condition of the fellow eye

The fellow eye was also examined simultaneously. The idea behind this was to carve out the management but the figures turned out to be interesting.



Type	Number	Percentage
Immature Cataract	21	51.21%
Aphakia	09	21.93%

Mature Cataract	06	14.62%
Normal	03	07.31%
Pthisis	02	04.90%

From the above data it was observed that pseudophakia was conspicuous by absence. This is perhaps an indication that most of the people who go for I.O.L. are aware of the seriousness of cataract and undergo timely treatment of the disease.

Literacy status

Of the 41 patients in the study group 33 were found to be illiterate and as high as 40 patients belonged to the areas. So it would not be an understatement that lens-induced glaucoma is a disease of rural illiterate class.

At this point it is worthwhile to compare our results with those already published. In some studies incidence of lens induced glaucoma is reported to be 3.91% and 3.40% of the total number of cataracts operated. Some other workers have observed that incidence of Phacomorphic glaucoma is more than phacolytic glaucoma.

The incidence as per this study is much higher in this region and the reasons, which could be ascertained, were as follows:

1. Socio-economic backwardness.
2. Self neglect due to lack of education.
3. Smaller study group.

The higher incidence of phacolytic glaucoma could not be explained and further studies are required.

A predilection for fair sex has been observed with maximum incidence occurring around 65 +/-2 years.

The patients were further divided into two groups, according to duration of onset of disease. Group 'A' included patients of 1- 5 days of duration of onset of acute attack and group 'B' included patients of duration of illness of 6 days onwards. The former group included 16 (44.8 %) out of 36 operated cases while the later group included 20 (56 %) of cases. This was done for statistical evaluation of the results in the two groups to know the effect of duration of illness. In all, the duration of attack varied between 3 hours to 24 days. Seven eyes presented with acute attack within 2 days, 9 eyes between 3-5 days, 7 eyes between 6-10 days, 5 between 11-20 days and 8 eyes presented with acute attack more than 20 days. In group A, 16 eyes presented with the acute attack

within 5 days while most eyes had history of attack more than 5 days.

Presentation of symptoms

The classical history, which we noticed was that there was a gradual progressive loss of vision followed by an episode/s of severe pain and each such episode, caused marked loss of vision. The loss of vision was permanent and there was no recovery even after the pain subsided.

Symptoms in lens induced glaucoma in order of frequency:

<u>S.No</u>	<u>Symptoms</u>	<u>No. of patients</u>	<u>%age</u>
1	Diminution of vision	41	100
2	Eye pain	41	100
3	Redness	41	100
4	Headache	37	74.4
5	Nausea and vomiting	18	43.2
6	Watering of eyes	11	26.4
7	Swelling of lids	10	24

Diminution of vision, eye pain and redness of eye presented in all cases of the lens induced glaucoma, 37 (74.4%) cases had headache, 18 (43.2%) patients had nausea / vomiting 10 (24%) patients had swelling of lids and 11 (26.4) patients had watering of eyes.

Signs

The patients were established as per the established protocol and the clinical signs are listed in the following table in order of frequency.

<u>S.No</u>	<u>Signs</u>	<u>No. of patients</u>	<u>%age</u>
1	Circumcorneal congestion	41	100
2	Dilated pupil	41	100
3a	Defective vision(HM/FC)	15	36
3b	PL/PR	10	24
3c	Only PL	6	14.4
3d	Doubtful PL	5	12
4	Raised intraocular pressure	41	100
5	Senile cataract	39	93.6

6	Hazy cornea	31	74.4
7	Conjunctival congestion	28	67.2
8	Aqueous flare	24	57.6
9	Lid oedema	12	28.8

It was observed here that circumcorneal congestion, dilated pupil, shallow anterior chamber, defective vision and varied intraocular pressure were present in all the cases.

On slit lamp examination 24 patients had aqueous flare with loss of iris pattern and 12 patients showed presence of synechia which was mostly observed in the immediate preoperative period.

Preoperative visual acuity

The preoperative visual acuity was diminished due to lenticular opacity and corneal oedema mainly. Though it was recorded in all 41 cases only 36 of them underwent surgery. For statistical simplification an account of only 36 patients is given here.

Visual acuity	No. of eyes	%age
Hand movement	15	40.50%

PL/PR	10	27%
Only PL	6	16.20%
Doubtful PL	5	13.50%

This table shows the preoperative visual acuity of 36 cases. 15 (40.50%) were able to appreciate hand movement, 10 (27%) patients had PL/PR (including defective PR), 6 (16.20%) eyes were PL +ve. 5 (13.5%) patients had doubtful PL. Though it might be argued that PCIOL implantation is not justified in cases with doubtful PL, it was done in this study to make this work more comprehensive and to ensure its comparative nature.

Pre Operative Intra Ocular Tension

<u>S.No</u>	<u>Duration of attack</u>	<u>No. of eyes</u>	<u>Average preop IOP</u>
A1	<2 days	7	34.3
A2	3-5days	9	45.4
B1	6-10 days	7	43.88
B2	11-20days	5	45.5
B3	>20 days	8	51.7

Pre-operative average tension was recorded in group A and in group B. The minimum intraocular pressure recorded was 26.6 and maximum 69.3.

Complications

The various complications which occurred pre-operatively during operation and immediately after operation are recorded in the table below

S.No	Complications	No. of cases	%age
1	Hyphema	2	5.6
2	Iritis	10	28
3	Vitreous loss	0	0
4	PC rent	1	2.8
5	striate keratitis	12	33.6

Pre-operative Complications -

There were no complications.

Intra-operative complications -

The hyphaema was seen in 2 (5.6%) eye that was massive and lead to corneal staining. Iritis occurred in 10

(28%) eye while vitreous loss occurred in 0 eyes. A small posterior capsular rent occurred in 1 (2.8%) eye.

Immediate post-operative complications -

The complications occurring within one and half months of the follow up period were considered immediate or early post-operative complication.

The Striate keratitis was observed in 12 (33.6%) cases. It cleared in all the cases by the end of 15 days of follow up.

Iritis was seen in 10 (28%) eyes, it was mild in 6 cases while moderate in to severe in 4 cases and was treated accordingly. In one case iritis was associated with massive hyphema.

Visual prognosis

After 6 weeks of follow up spectacle correction was done. The corrected visual acuity is given in the table below

Duration of attack	Total No. of eyes	Pre-op visual acuity	Final Visual Acuity					
			6/12 or better	6/24 - 6/18	6/60 - 6/36	6/60 or less	HM	Pl-ve
Group A <2 days	7	HM/FC	3	3	1	0	0	0
		PL/PR						
		only PL						
		doubtful PL	0					
3-5 days	9	HM/FC	4	5	0	0	0	0
		PL/PR						
		only PL	0					
		doubtful PL	0					
Group B 6-10days	7	HM/FC	1	3	1	2	0	0
		PL/PR	3					
		only PL	1					
		doubtful PL	0					
11-20 days	5	HM/FC	0	2	1	2	0	0
		PL/PR	2					
		only PL	1					
		doubtful PL	2					
>20 days	8	HM/FC	0	0	5	2	1	0
		PL/PR	1					
		only PL	4					
		doubtful PL	3					
Total	36	36	8	13	8	6	1	0

The cases were divided into five groups on the basis of duration of attacks. Each group was further divided into four sub-groups on the basis of vision. Group A 1 consisted of cases having a history of less than 2 days. It consisted of 7 eyes of which 3 (42.6 %) had final visual acuity better than 6/12, another 3 eyes had final visual acuity between 6/18 – 6/24 (42.6 %). One out of the 7 eyes had final visual acuity of less than 6/60. Group A 2 consisted of cases having a history of 3 – 5 days. It was the largest of the study groups having a total number of 9 eyes. Four out of nine eyes attained a visual acuity of 6/12 or better (44.4 %), 5 eyes (56.6%) attained final visual acuity of 6/18 – 6/24. The group, which gave a history of 6 – 10 days, consisted of 7 patients. Only 1 eye achieved the final visual acuity of 6/12 or better, 3 had visual acuity between 6/18 – 6/24, one eye attained final visual acuity of 6/36 while 2 eyes had visual acuity of less than 6/60. Similarly the group with history of 11-20 days consisted of 8 eyes. Two eyes achieved visual acuity of better than 6/24, 1 eye had 6/36 vision and 2 recorded visual acuity worse than 6/60. The last group that is the one having a history of more than 20 days had a total of 8 patients. In this group 5 eyes had final vision between 6/36 – 6/60, 2 had vision less than 6/60 and 1 had vision H.M. only.

A similar relationship was also established between mean intra-ocular pressure and visual acuity. It is shown in the table given below.

Duration of attack	Total No. of eyes	Mean IOP in mmHg	Final Visual acuity					
			6/12 or better	6/24 - 6/18	6/60 - 6/36	6/60 or less	HM	Pl-ve
<2days	7	34.3	3	3	1	0	0	0
3-5 days	9	45.4	4	5	0	0	0	0
<u>GroupB</u> 6-10days	7	43.88	1	3	1	2	0	0
11-20 days	5	45.5	0	2	1	2	0	0
>20 days	8	51.7	0	0	5	2	1	0
Total			8	13	8	6	1	0

The above mentioned table shows that the mean IOP of group A1 was 34.3 mm of Hg, mean IOP of group A2 was 45.5 mm of Hg, mean IOP of group B1 was 43.8 mm of Hg, mean IOP of B2 was 45.5 mm of Hg, mean IOP of B3 was recorded as 51.7 mm of Hg. The visual results of these groups have already been discussed.

Likewise, an attempt is made here to establish a relationship between the mean pre-operative and mean post-operative intra-ocular pressure. It is shown in the table given below.

Duration of attack	Total No. of eyes	Mean IOP in mm Hg	Mean post-op IOP
Group A			
< 2 days	7	34.3	18.9
3-5 days	9	45.4	20.4
Group B			
6-10 days	7	33.88	21
11-20 days	5	45.5	24.2
>20 days	8	51.7	32.3

The mean post-operative intra-ocular pressure, that is one and a half months after operation, of group A1 was recorded as 18.9 mm of Hg. Group A2 had 20.4 mm of Hg as mean intra-ocular pressure. Similarly group B1,B2 and B3 recorded 21,24.2 and 32.3 mm of Hg as mean intra-ocular pressure.



Discussion

DISCUSSION

Lens induced glaucoma is a rather common entity in the Ophthalmics department of M.L.B. Medical College Jhansi. This is perhaps due to the fact that the total cataract surgeries performed are far less than the total surgeries required. What ever be the type, there is always a compromise in the optic nerve function due to rise in intra ocular pressure. All the cases of lens induced glaucoma have a guarded prognosis.

In this study the incidence of lens induced glaucoma, with particular reference to the regional increase has been worked out. An attempt has been made to predict the possible risk factor and probable final visual acuity.

During the period of this study a total of 619 cataract surgeries were performed in our department by various units of these 36 were treated for lens induced glaucoma. 5 patients did not turn up for surgery. Such patients have been included in our study only for clinical and academic interest. So the total number of patients was 41 and the incidence was found and the incidence was found to be 6.62%.

Jain et al (1982) reported incidence of 3.91% , Dhar (1984) reported 3.40%, Angra et al (1991) reported an incidence of (3.91%). The incidence in this study is much higher and it could be due to socio-economic backwardness,

self neglect due to lack of education and a much smaller study group.

Out of 41 cases in this study 29 turned out to be of phacolytic type and 08 were phacomorphic type. Rathi et al (1996) reported 46 cases of phacomorphic glaucomas out of 62 eyes. Similar results have been reported by Pranja et al (1996). To explain this disparity we need further studies which are beyond the scope of this work.

In our study, females seem to be at a higher risk of developing lens induced glaucoma (56.09%) Probably it is because of lesser attention paid to the older females or due to shallower anterior chamber depth in females. Similar findings have been reported by Chatterjes et al (1982), Framingham eye study (1977), Pranja et al (1996), Jain et al (1983), Angra et al (1991) and Rathi et al (1998).

Most of the cases (39.02%) were between 61-70 years of age with peak incidence around 65 ± 2 yrs.

Fellow eye was also observed in each case and most of the cases had immature cataract. It was observed that no case had pseudophakia. This was probably because those going for IOL were aware of the gravity of the disease and they underwent timely treatment. At the time of 1st OPD visit 40.50% patients had a visual acuity of hand movement, 27% PL/PR. 16.20% had PL only with defective PR and 13.5% patients doubtful PL.

The patients were divided into 5 categories on the basis of duration of attack. 7 cases reported within 2 days of attack 9 between 3-5 day 7 between 6-10 days and 5 between 11-20 days and 8 cases reported after 20 days. Those reporting within 2 days had a mean IOP of 34.3 mm of Hg, those between 3-5 days had mean IOP of 45.4mm of Hg, those reporting between 6-10 days had mean IOP of 33.8mm of Hg. Patients reporting between 11-20 days had an IOP of 45.5 mm of Hg and those having more than 20 days of history had mean IOP of 51.7. It could be ascertained that there is an increase in mean IOP with the duration of illness. Jain et al (1983) and Pranja et al (1996) report similar findings but Angara et al (1991) found no relationship between duration of attack and the height of IOP.

The intraoperative and post operative complications were noted. Striate keratitis (33.6%) and iritis (28%) were the most frequent complications. The possible reasons were analysed. It was thought that it was due to turbulence endotheliopathy or lens rubbing against the cornea. Iritis could be pre-existing or due to excessive handling of iritis during surgery. It is proposed that cleaning of cortical material should be done in a formed anterior chamber using viscoelastic and one should prefer an indirect simcoe canula. Section could be enlarged to ensure proper delivery of lens. As far as iritis is concerned, an attempt must be made to

control it preoperatively using topical betamethasone sodium phosphate (0.1%).

Vitreous loss and PC rent can be avoided by using pre operative mannitol to a great extent.

As discussed previously the patients were divided into 5 groups on the basis of duration of attack. The preoperative visual acuity was noted carefully. The 7 patients who reported within 2 days had vision of hand movement. Out of 9 patients. reporting between 3-5 days 5 had hand movement and 4 had PL/RR. A total of 7 patients reported between 6-10 days 3 of them had hand movement, 3 had PL/RR and 1 had only PL present. 5 patients reported between 11-20 days. 2 of them had PL/PR one had PL and 2 had doubtful PL. Those reporting after 20days had the worst visual acuity, one had PL/RR , 4 had only PL and 3 had doubtful PL, Thus it can be concluded that pre operative visual acuity is related with the duration of attack. Jain et al (1983), Angra et al (1981) and Singh et al (1994) obtained similar findings. Angra et al (1991) stated that this could probably be because of the rudder high intraocular pressure which could cause optic nerve ischemia leading to conduction defects.

Earlier, intracapsular cataract extraction was considered to be the treatment of choice for lens induced glaucomas. It was agreed that posterior capsule is very fragile due to microscopic defects particularly in phacolytic

glaucoma. Zeeman (1943) reported that this may lead to phacolytic glaucoma. Extracapsular surgery was first advocated by Irvine in 1957. He was of opinion that this technique minimized the chances of vitreous loss. The current technique of co-axial microscopic extracapsular extraction was popularised by Gross and Pearce (1984). They reported excellent results in cases of phacolytic glaucoma. Lane et al reported similar findings in 1988. They performed extra capsular cataract extraction with posterior chamber intraocular lens implantation and also controlled intraocular pressure with excellent visual results. Similar findings were reported by Jain et al (1993), Singh et al (1994), Pranja et al (1996). Mandal AK (1996) advocates aspiration of fluid cortex from the capsular bag and fixation of intraocular lenses in phacolytic glaucoma. The surgical treatment of lens induced glaucoma has thus come a long way from intracapsular cataract extraction to standard extracapsular cataract extraction and now with in the bag posterior chamber intraocular lens implantation.

In order to ascertain the final visual acuity each group was further sub divided into 6 groups on basis of final visual acuity. Of 7 cases in group A , 3 were clubed in group attaining vision 6/12 or better another 3 had vision between 6/24 - 6/18 and 1 had vision between 6/36 6/60. In group A2 4 patients achieved 6/12 or better vision and 5 had vision between 6/24 - 6/18. In group B1 only 1 could achieve 6/12

or better vision 3 had vision between 6/24 - 6/18 and one had vision between 6/60 - 6/36 and 2 had vision less than 6/60. In group B2 no patient had vision of 6/12 or better, 2 could get vision between 6/24-6/18 , 1 had vision between 6/60-6/36 and 2 had vision less than 6/60. In group B3 no patient could achieve vision of 6/12 or better on even 6/24 - 6/18. 5 patients had vision 6/60 - 6/36. 2 had vision of 6/60 or less and one patient had hand movement. The results were thus analysed

6/12 or better	8
6/24 - 6/18	13
6/60 - 6/36	8
6/60 or less	6
Hand movement	1

The causes for low vision were evaluated. A total of 9 patients showed glaucomatous disc changes. 3 patients and persistent and severe iritis and 2 probably had age related macular degeneration.

It was also observed that the patient who presented late had poor post-operative vision. This also explains the lesser percentage of patients with good visual recovery. Jain et al (1983) also reported that as the duration of attack increases there was a progressive decline in the recovery of visual acuity and beyond 3 weeks only light perception or hand

movement could be recovered . Angra et al (1991) also reported that the final visual prognosis was directly proportional to the duration of attack. Pranja et al 1996 had similar findings.

We also noted that patients reporting within 10 days of attack had normal intraocular pressure without any medication. Those reporting after this were advised timilol malate 0.5% solution and regular followup.



*Summary
And
Conclusion*

SUMMARY AND CONCLUSION

This work is an experimental study where ECCE with PCIOL implantation was performed to control the intraocular pressure , complication and to provide good vision in cases of lens induced glaucoma.

From a total of 619 cataract cases undergoing surgery total cases recorded were 41 of which 36 underwent surgery. Hence incidence was calculated to be 6.62%. Phacolytic glaucoma was 70.7% of total lens induced glaucoma cases. Female predominance was observed.

The pre-operative usual acuity and intraocular pressure was related directly to the duration of attack.

ECCE with PCIOL was found to be safe and effective method of visual rehabilitation particularly when the duration of attack was less than 5 days.

Intra ocular pressure could be effectively controlled if the duration of attack is between 5-10 days.

From the study we came to the following conclusions.

1. Pre-operative intra ocular pressure was directly related to the duration of attack.
2. Pre-operative visual acuity was inversely related to the duration of attack.

3. Final visual outcome was related to the duration of attack and to the intra ocular pressure.
4. Extra capsular cataract extraction with posterior chamber intra ocular lens implantation can be performed in cases of lens induced glaucoma. Good visual acuity is expected if the duration of attack is less than 5 days.
5. Intra-ocular pressure can be effectively controlled if the duration of attack is between 5-10 days. Triple procedure may be done in cases having a duration more than this.



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